



## MATH APPLICATION ACTIVITY: THE GLOBAL CARBON BUDGET

**OBJECTIVE:** Students will:

- ✚ Compute the net fluxes and residence times of carbon;
- ✚ Model the carbon reservoirs and fluxes and
- ✚ Consider what might happen to the increasing carbon dioxide produced by human activities.

**PROCEDURE:** Post the directions below on chart paper OR provide copies for students.

1. Use the information in the **DATA TABLE 1: CARBON RESERVOIRS** to complete the diagram of the global carbon cycle. Put the number of ***gigatons of carbon (GtC)*** stored in each reservoir in the small boxes in each reservoir. One gigaton (Gt) equals 1,000 million tons, and 1 ton equals 1,000 kg.
2. **DATA TABLE 2** shows the fluxes of carbon between reservoirs, measured in ***gigatons of carbon per year (GtC/yr)***. Add these fluxes to the diagram of the global carbon cycle. **Label each line and indicate the direction of flow with arrows.**
3. Calculate the net flux for the atmosphere, the land, and the oceans. **Show your work including units.**
4. The average time that carbon atoms spend in a reservoir is called the ***residence time***. You can calculate residence time by dividing the number of gigatons of carbon in the reservoir by the total flux from that reservoir. For example, to calculate the residence time of carbon in the atmosphere, divide the total amount of carbon in the atmosphere (**Ex: 750 Gt**) by the total flux out (**105 Gt to ocean + 110 Gt to life on land**).

$$\frac{750 \text{ Gt}}{215 \text{ Gt/yr}} = 3.5 \text{ yrs}$$

## Teacher Sheet 2

5. Calculate the average residence time for carbon in living land organisms, for carbon in soil, and for carbon in the ocean.  
**Show your work, including units!**
6. Complete the analysis questions and be ready to share them in a class discussion.